PORTABLE TERMINAL AND OPENING OR CLOSING METHOD THEREFOR

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a portable terminal such as a personal digital cellular (PDC), a personal handy-phone system (PHS), a code division multiple access (CDMA), a global system for mobile communication (GSM), a personal digital assistants (PDA) having a date-book size, or a portable personal computer. More particularly, the present invention relates to a portable terminal in which one casing is coupled to another casing via a rotating mechanism at their ends.

[0003] 2. Description of the Related Art

[0004] Various portable terminals are currently manufactured, such as a PDC, a PHS, a CDMA, a GSM, a wide band CDMA (WCDMA) under development as a next-generation technology, a portable phone with CDMA2000 or other communication means, a PDA having a datebook size, or a portable personal computer. These types of portable terminals, having a foldable mechanism superposing one casing on the other casing for increased portability, have become popular. Among them, for example, there has been suggested a portable terminal wherein one casing having a display unit is connected to the other casing having an operation unit via a coupling unit and wherein the casings may be opened or closed with the face having the display unit of one casing directed in the same direction as the face having the operation unit of the other casing.

[0005] For example, in Japanese Unexamined Patent Publication (Kokai) No. Hei7-288860 (1995), as shown in **FIG. 25**(A) and **25**(B), there has been disclosed a portable terminal **200**, comprising one casing **201** having a display unit **207** and a speaker **208** coupled to the second casing **203** having an operation unit **206** and a microphone **205** via a hinge axis unit **204**, wherein one casing **201** is rotated horizontally to a face **203***a* having the operation unit **206** and the microphone **205** of the second casing **203** in a condition that a face **202** having the display unit **207** and the speaker **208** of one casing **201** is directed in the same direction as for the face **203***a* having the operation unit **206** and the speaker **205** of the second casing **203**. An antenna **209** is disposed so as to be retractable at an end of one casing **201**.

[0006] Also, in Japanese Unexamined Patent Publication (Kokai) No. 2002-158758, as shown in **FIG. 26**(A) and **26**(B), there has been disclosed a portable terminal **210**, comprising one casing **211** having a display unit **222** and a speaker **223** and the other casing **215** having an operation unit **221** and a microphone **220**. There is provided an inclined face **217** protruding from a face **216** having the operation unit **221** and the microphone **220** of the second casing **215** when the first casing **211** and the second casing **215** are oppositely disposed so that a face **213** having the display unit **222** and the speaker **223** of the first casing **211** is directed in the same direction as for the face **216** having the operation unit **221** and the microphone **220** of the second casing **215**. There is also provided an inclined face **214** notched so as to correspond to the inclined face **217** on an opposite face **212** to the face **213** having the display unit **222** and the speaker **223** of the first casing **211**. The inclined face **214** is coupled to the inclined face **217** via a rotating shaft **219**, and the first casing **211** is rotated relative to the second casing **215** around the rotating shaft **219**. An antenna **224** is disposed at an end of the second casing **215**.

[0007] Both the portable terminals **100** and **210** shown in FIGS. **25**(A) and **25**(B) and FIGS. **26**(A) and **26**(B) are capable of displaying information on the display units **207** and **222** when they are closed as shown in **FIG. 25**(B) and not just when they are opened as shown in **FIG. 25**(A) and **FIG. 26**(A), respectively.

[0008] The portable terminal **200** shown in FIGS. **25**(A) and **25**(B), however, is such that the casing **201** rotates parallel to the face **203***a* having the operation unit **206** and the microphone **205** of the second casing **203**. Therefore, the first casing **201** slides on the operation unit **206** of the second casing **203** and keystop symbols on the top face of the operation unit **206** are thereby rubbed by the first casing **201**. The keystop symbols may therefore become unreadable and the face opposed to the speaker **208** of the first casing **201** may also be damaged by a flaw or dirt.

[0009] Furthermore, due to the first casing **201** rotating parallel to the face **203***a* having the operation unit **206** and the microphone **205** of the second casing **203**, the face **203***a* having the operation unit **206** and the microphone **205** of the second casing **203** is disposed in parallel to the face **202** having the display unit **207** and the speaker **208** of the first casing **201** when this casing **201** is opened relative to the second casing **203**. The face **203***a* is disposed at the rear of the face **202** having the display unit **207** and the speaker **208** of the first casing **201**. Thus the terminal is incapable of bringing the microphone **205** of the second casing **203** close to a user's mouth when the user bends his or her ear to the speaker **208** of the first casing **201** during a phone call, thereby causing a problem of a low sound collecting rate, by which the user cannot transmit clear speech sounds to the other party.

[0010] In addition, the portable terminal **210** shown in FIGS. **26**(A) and **26**(B) also is such that the first casing **211** rotates horizontally to the face **216** having the operation unit **221** and the microphone **220** of the second casing **215** at an initial stage of the rotation. Therefore, the first casing **211** slides on the operation unit **221** of the second casing **215** and thereby keystop symbols on the top face of the operation unit **221** may be rubbed by the first casing **211**, making the symbols unreadable and may damage the opposite face to the speaker **223** of the first casing **211** with a flaw or dirt.

SUMMARY

[0011] A portable terminal is described below to address the need for preventing surfaces coming into contact when rotating open the portable terminal. One aspect of the invention is a portable terminal having a first casing and a second casing The casings have respective first and second surfaces facing a user of the portable terminal. The portable terminal includes a rotating mechanism coupling the first casing to the second casing and inclining the first casing relative to the second casing during at least an initial stage of rotating the first casing relative to the second casing. The surfaces substantially face the user when rotating the first casing relative to the second casing.

[0012] Another aspect of the invention is an opening or closing method for use in a portable terminal having a